

5. RANCH HAND EXPOSURE ANALYSES

The exposure of a Ranch Hand to dioxin has been estimated as being proportional to the number of gallons sprayed and inversely proportional to the number of men in the subject Ranch Hand's occupational category during his tour. This index has been categorized to "low", "medium" and "high" levels and has been considered a surrogate for a direct body measurement of exposure. Actual body burdens of dioxin are currently being determined for 2000 of the participants in the morbidity phase of this study, but this procedure is not feasible for use in the mortality phase. The effect of dioxin exposure on Ranch Hand mortality was assessed within the Ranch Hand group via loglinear analysis. Additionally, the one-sample person-years approach has been applied to assess whether the Ranch Hand versus all Comparison mortality contrast changes with levels of dioxin exposure within the Ranch Hands.

The loglinear analysis included rank (Officer, Enlisted), tour (early, late), exposure (low, medium, high) and mortality (dead, alive). The data are summarized in Table 53.

TABLE 53

Survival versus Air Force Exposure Index Levels within
the Ranch Hands with Adjustment for Rank and Tour

Rank	Tour	Exposure				Total
		Survival	Low	Medium	High	
Officer	Early	Dead	3	9	9	21
		Alive	54	106	137	297
		Total	57	115	146	318
	Late	Dead	4	1	0	5
		Alive	91	33	20	144
		Total	95	34	20	149
Enlisted	Early	Dead	11	11	18	40
		Alive	104	226	197	527
		Total	115	237	215	567
	Late	Dead	6	2	0	8
		Alive	143	36	40	219
		Total	149	38	40	227

There is no significant association between exposure level and mortality in these data with ($P=0.51$) or without ($P=0.82$) adjustment for rank and tour date. There is a strong marginal association between tour date and exposure ($P<.001$) which is expected because the spraying was more intense during late

tours than during early tours. Prior to 1965, only 3 aircraft were assigned to the Ranch Hand mission and this number increased to 36 by 1968.

The one-sample person-years analysis was carried out within each level of rank (Officer, Enlisted) to assess whether the Ranch Hand versus all Comparison mortality contrast changed with levels of exposure. Person-years were computed from tour start date. The results are summarized in Table 54.

TABLE 54
Ranch Hand Exposure within Officers and within Enlisted
One-sample Person-years Assessment Relative to
All Comparisons

Analysis within the Officers

Exposure	Number of Deaths	Adjusted Expected Deaths	Adjusted SMR
Low	7	7.52	0.93
Medium	10	10.16	0.98
High	9	9.69	0.93

Contrast	Relative Risk	P-value
Medium versus Low and High	1.06	0.91
High versus Low and Medium	1.00	1.00

Analysis within the Enlisted Personnel

Exposure	Number of Deaths	Adjusted Expected Deaths	Adjusted SMR
Low	17	14.70	1.16
Medium	13	13.78	0.94
High	18	17.56	1.03

Contrast	Relative Risk	P-value
Medium versus Low and High	0.82	0.58
High versus Low and Medium	0.89	0.72

Both the loglinear and one-sample person-year analysis fail to reveal any relationship between mortality and the exposure index.

Unpublished dioxin assay results suggest that the Air Force exposure index is not a valid measure of exposure to TCDD. The relationship between this index and dioxin body burden in living Ranch Hands will be described in a forthcoming report.